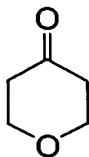


[Document name] Claims

[Claim 1]

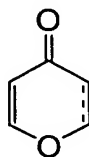
A process for preparing tetrahydropyran-4-one represented by the formula (1):



(1)

5

which comprises reacting at least one kind of dihydropyran-4-one and pyran-4-one represented by the formula (2):



(2)

10            wherein  $\equiv$  represents a single bond or a double bond,

and hydrogen

(a) in the presence of a metal catalyst, in a mixed solvent of an aprotic solvent and an alcohol solvent, or

15            (b) in the presence of an anhydrous metal catalyst in which a hydrated metal catalyst is subjected to dehydration treatment, in a hydrophobic organic solvent.

[Claim 2]

20            The process for preparing tetrahydropyran-4-one according to Claim 1, wherein the dehydration treatment is carried out by using an organic solvent which can be subjected to azeotropic distillation with water.

[Claim 3]

25            The process for preparing tetrahydropyran-4-one according to Claim 1, wherein the metal catalyst contains at least one metal atom selected from the group consisting of palladium, platinum and nickel.

[Claim 4]

30            The process for preparing tetrahydropyran-4-one according to Claim 1, wherein the aprotic solvent is an aliphatic hydrocarbon, a halogenated aliphatic hydrocarbon,

an aromatic hydrocarbon, a halogenated aromatic hydrocarbon, a carboxylic acid ester, an ether, or a mixture thereof.

[Claim 5]

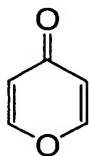
- 5        The process for preparing tetrahydropyran-4-one according to Claim 1, wherein an alcohol solvent in the mixed solvent is contained in the range of 5 to 95% by volume.

[Claim 6]

- 10       The process for preparing tetrahydropyran-4-one according to Claim 1, wherein the hydrophobic organic solvent is an aliphatic hydrocarbon or an aromatic hydrocarbon.

[Claim 7]

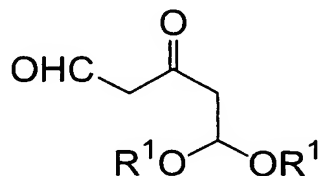
- 15       The process for preparing tetrahydropyran-4-one according to Claim 1, wherein the compound represented by the formula (2) is pyran-4-one represented by the formula (2'):



(2')

- 20       [Claim 8]

The process for preparing tetrahydropyran-4-one according to Claim 7, wherein the pyran-4-one represented by the formula (2') is a compound obtained by reacting 5,5-dialkoxy-3-oxopentanal represented by the formula (3):



(3)

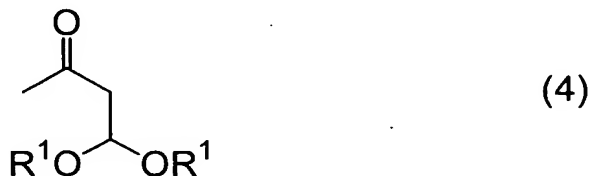
- 25

wherein  $R^1$  represents an alkyl group, and two  $R^1$ 's may be bonded to each other to form a ring, or an equivalent thereof, or a salt thereof with an acid.

[Claim 9]

- 30       The process for preparing tetrahydropyran-4-one

according to Claim 8, wherein a salt of the 5,5-dialkoxy-3-oxopentanal represented by the formula (3) or a salt of an equivalent thereof is a compound obtained by reacting 1,1-dialkoxybutan-3-one represented by the formula (4):

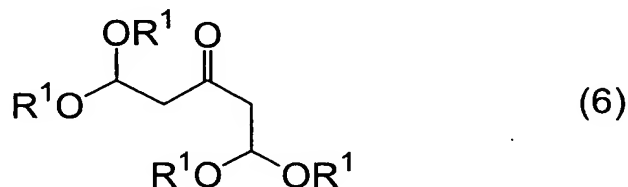


wherein  $\text{R}^1$  has the same meaning as defined above, and a formic acid ester represented by the formula (5):



wherein  $\text{R}^2$  represents an alkyl group, in an organic solvent in the presence of a base, [Claim 10]

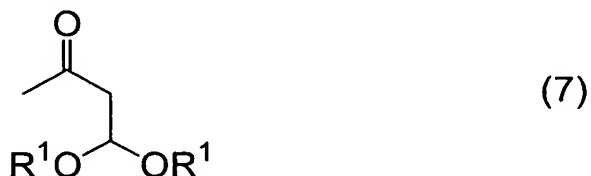
The process for preparing tetrahydropyran-4-one according to Claim 7, wherein the pyran-4-one represented by the formula (2') is a compound obtained by subjecting 1,1,5,5-tetraalkoxyptentan-3-one represented by the formula (6):



wherein  $\text{R}^1$  has the same meaning as defined above, or an equivalent thereof to cyclization in the presence of an acid.

[Claim 11]

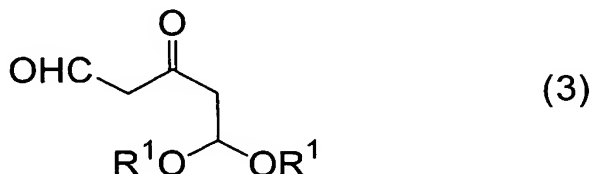
The process for preparing tetrahydropyran-4-one according to Claim 7, wherein the pyran-4-one represented by the formula (2') is a compound obtained by reacting 1,1-dialkoxybutan-3-one represented by the formula (7):



wherein  $R^1$  has the same meaning as defined above, or an equivalent thereof and a formic acid ester represented by the formula (5):



5 wherein  $R^2$  has the same meaning as defined above, in an organic solvent in the presence of a base, to form a salt of 5,5-dialkoxy-3-oxopentanal represented by the formula (3):



10 wherein  $R^1$  has the same meaning as defined above, or a salt of an equivalent thereof, then, reacting an acid thereto.

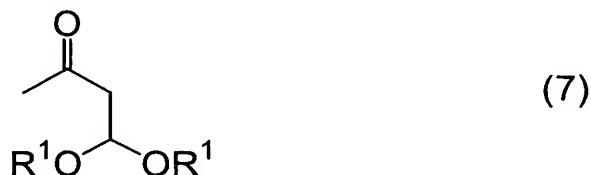
[Claim 12]

The process for preparing tetrahydropyran-4-one according to Claim 11, wherein the organic solvent is an aromatic hydrocarbon or a nitrile.

[Claim 13]

A process for preparing tetrahydropyran-4-one which comprises two steps of

20 (A) cyclization step in which 1,1-dialkoxybutan-3-one represented by the formula (7):



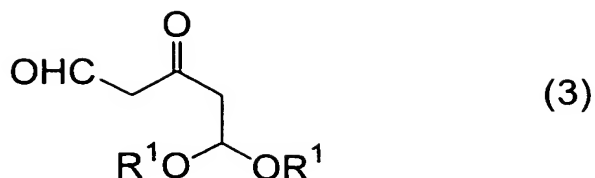
wherein  $R^1$  represents an alkyl group, and two  $R^1$ 's may be bonded to form a ring,

25 and a formic acid ester represented by the formula (5):



wherein  $R^2$  represents an alkyl group, are reacted in an organic solvent in the presence of a base, to prepare a salt of 5,5-dialkoxy-3-oxopentanal represented by the formula (3):

30



wherein R<sup>1</sup> has the same meaning as defined above,  
 or a salt of an equivalent thereof, and reacting the salt  
 with an acid to prepare crude product containing pyran-4-  
 5 one represented by the formula (2'):



as a main component, then,

- (B) reduction step in which the crude product containing  
 the pyran-4-one as a main component and hydrogen are  
 10 reacted in the presence of a metal catalyst,  
 (a) in a mixed solvent of an aprotic solvent and an alcohol  
 solvent, or  
 (b) in the presence of an anhydrous metal catalyst in which  
 a hydrated metal catalyst is subjected to dehydration  
 15 treatment, in a hydrophobic solvent, to prepare tetrahydro-  
 pyran-4-one represented by the formula (1):



[Claim 14]

The process for preparing tetrahydropyran-4-one  
 20 according to Claim 13, wherein the metal catalyst contains  
 at least one metal atom selected from the group consisting  
 of palladium, platinum and nickel.

[Claim 15]

The process for preparing tetrahydropyran-4-one  
 25 according to Claim 13, wherein the aprotic solvent is an  
 aliphatic hydrocarbon, a halogenated aliphatic hydrocarbon,  
 an aromatic hydrocarbon, a halogenated aromatic hydro-

carbon, a carboxylic acid ester, an ether, or a mixture thereof.

[Claim 16]

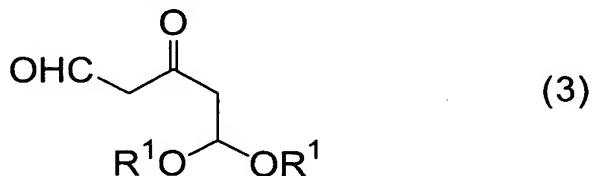
5 The process for preparing tetrahydropyran-4-one according to Claim 13, wherein an alcohol solvent in the mixed solvent is contained in the range of 5 to 95% by volume.

[Claim 17]

10 A process for preparing pyran-4-one represented by the formula (2'):



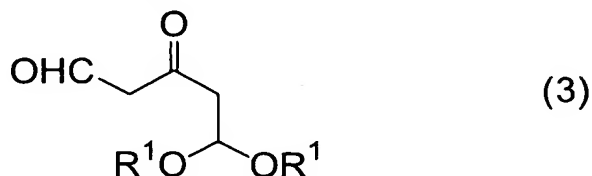
which comprises reacting 5,5-dialkoxy-3-oxopentanal represented by the formula (3):



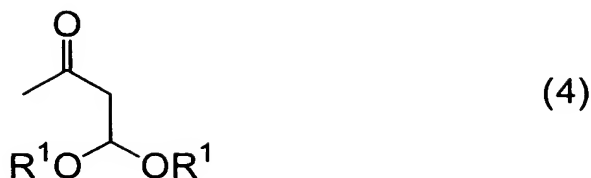
15 wherein R<sup>1</sup> represents an alkyl group, and two R<sup>1</sup>s may be bonded to form a ring, or an equivalent thereof, or a salt thereof with an acid.

[Claim 18]

20 A process for preparing a salt of 5,5-dialkoxy-3-oxopentanal represented by the formula (3):



wherein R<sup>1</sup> has the same meaning as defined above, or an equivalent thereof, which comprises reacting 1,1-dialkoxybutan-3-one represented by the formula (4):



wherein R<sup>1</sup> represents an alkyl group, and two R<sup>1</sup>s may be bonded to form a ring,  
and a formic acid ester represented by the formula (5):



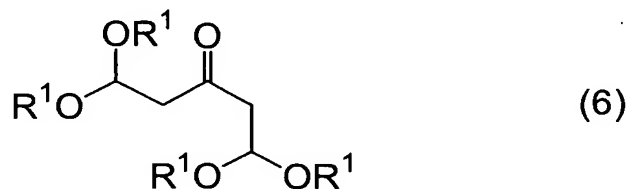
wherein R<sup>2</sup> represents an alkyl group,  
in an organic solvent in the presence of a base.

[Claim 19]

A process for preparing pyran-4-one represented by  
10 the formula (2'):



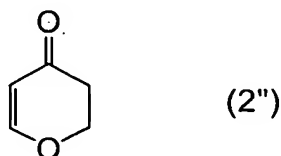
which comprises subjecting 1,1,5,5-tetraalkoxypentan-3-one represented by the formula (6):



15 wherein R<sup>1</sup> represents an alkyl group, and two R<sup>1</sup>s may be bonded to form a ring,  
or an equivalent thereof to cyclization in the presence of an acid.

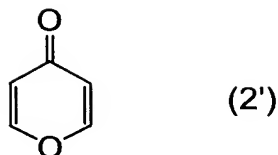
[Claim 20]

20 A process for preparing dihydropyran-4-one represented by the formula (2''):



which comprises reacting pyran-4-one represented by the

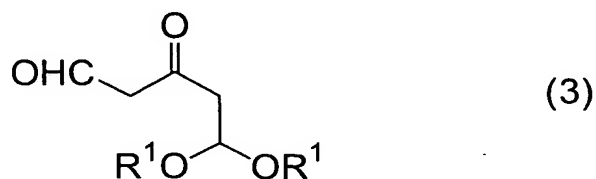
formula (2'):



and hydrogen in the presence of a metal catalyst, in a mixed solvent of an aprotic solvent and an alcohol solvent.

5 [Claim 21]

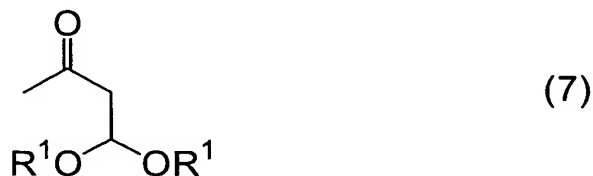
A sodium salt of 5,5-dialkoxy-3-oxopentanal represented by the formula (3):



10 wherein R<sup>1</sup> represents an alkyl group, and two R<sup>1</sup>s may be bonded to each other to form a ring, or a sodium salt of an equivalent thereof.

[Claim 22]

A process for preparing pyran-4-one which comprises reacting 1,1-dialkoxybutan-3-one represented by the formula  
15 (7):

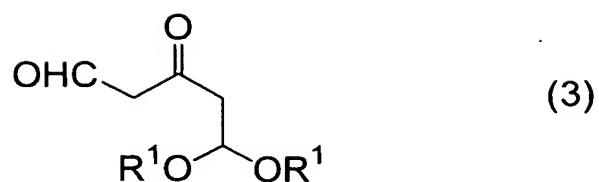


20 wherein R<sup>1</sup> represents an alkyl group, and two R<sup>1</sup>s may be bonded to each other to form a ring, or an equivalent thereof and a formic acid ester represented by the formula (5):



25 wherein R<sup>2</sup> represents an alkyl group, in an organic solvent in the presence of a base, to form a salt of 5,5-dialkoxy-3-oxopentanal represented by the formula (3):





wherein  $\text{R}^1$  has the same meaning as defined above,  
 or a salt of an equivalent thereof, and then, reacting an  
 acid to the salt to prepare pyran-4-one represented by the  
 5 formula (2'):



[Claim 23]

Use of an anhydrous metal catalyst for reducing  
 pyran-4-one and dihydropyran-4-one.

10 [Claim 24]

The process for preparing tetrahydropyran-4-one  
 according to any one of Claims 1 to 16, wherein the  
 anhydrous metal catalyst is a material obtained by  
 subjecting a hydrated metal catalyst to dehydration  
 15 treatment using an organic solvent which can be subjected  
 to azeotropic distillation with water.